

# Impact of Outdoor Air Pollution on Child Health and Well-Being

## Health and Policy Context

*Environmental conditions*, including outdoor *air quality*, can be important contributors to health. Exposure to poor outdoor air quality (i.e., air pollution) poses a substantial *health risk* to children and families. Outdoor *air pollution* includes particle pollution (i.e., smoke or particulate matter) and ground-level ozone (i.e., smog).<sup>1</sup>

Children are at a *heightened risk* of negative *health outcomes* caused by outdoor air pollution since their organs are still developing, and they have higher *air per body weight intake*. Negative *health outcomes* caused by exposure to air pollution can include, but are not limited to, adverse *birth outcomes*, *respiratory issues*, and other behavioral and *developmental outcomes*. Exposure to air pollution in childhood can also impact the risk of *chronic disease* in adulthood. In 2021, *59.3% of children* ages 0-17 lived in a county with air pollutant concentrations that exceeded the current air quality standards.

To address outdoor air quality concerns, in 1955, *Congress* enacted what is now referred to as the Clean Air Act, codified as *42 U.S.C. 7401 et seq.*<sup>2</sup> The Clean Air Act requires the Environmental Protection Agency (EPA) to set health-based air quality standards and deadlines for achieving these standards. The EPA also sets national emission standards for “point” sources of air pollution such as vehicles, power plants, and other industrial sources.<sup>3</sup> Congress updated the Clean Air Act through the Clean Air Act Amendments of 1990 (*P.L. 101-549*), legislation that *encourages* the use of market-based principles, promotes the use of clean energy alternatives, reduces energy waste, and promotes energy conservation. More recently, the Inflation Reduction Act of 2022 (*P.L. 117-169*) amended the Clean Air Act. States and state-delegated local *agencies* are responsible for ensuring compliance with the Clean Air Act.

This issue brief discusses the short- and long-term effects of air pollution on child health and development. Reducing childhood exposure to poor outdoor air quality could mitigate the adverse health outcomes associated with air pollution.

## Impact of Outdoor Air Pollution on Child Health, Development and Well-Being

Exposure to outdoor air pollution can impact childhood health and development as well as long-term health outcomes. Infants and children are particularly *sensitive* to air pollution since children tend to spend more time *outside* than adults, they *breathe* faster than adults, causing them to inhale more pollutants per pound of body weight, and because their *lungs* are still developing. According to an *issue brief* published by the American Academy of Pediatrics and other *research*, exposure to air pollution while in utero or during childhood can result in poor *birth* outcomes (e.g., low birth weight, preterm birth, or stillbirth), poor childhood health outcomes (e.g., reduced lung function growth and increased likelihood for asthma, suboptimal neurodevelopment) and for adults, increased risk for a range of chronic diseases.



## In Utero Exposure to Outdoor Air Pollution

Studies demonstrate an association between exposure to air pollutants during pregnancy and adverse birth outcomes, including *preterm birth*, *low birth weight*, which can *increase* rates of *infection*, and cardio-respiratory abnormalities, such as chronic lung disease of prematurity. Preterm birth and low birth weight are also associated with *neonatal morbidity* and mortality and increased morbidity in adulthood. Moreover, exposure to air pollution during the prenatal period can impair *immune system* and organ development and is associated with childhood *asthma* and other childhood respiratory symptoms. Exposure to air pollution during pregnancy can also increase risk of *stillbirth*.

## Asthma and Allergic Diseases

Studies have demonstrated an association between air pollution and *allergic diseases*, including:

- **Asthma.** Exposure to air pollution can increase the risk of *asthma development* and worsen *asthma outcomes*. Specifically, exposure to air pollution can *increase* the risk of asthma-related hospitalization, length of hospital stays, and rates of medication use, which can result in children missing *school* and parents/caretakers missing work.
- **Seasonal Allergies.** Seasonal *allergies*, triggered by environmental allergens like pollen, may be worsened by *air pollution*, as air pollution can make pollen more *allergenic* (i.e., higher capacity to trigger allergies).

### Marginalized Communities Are More Likely to Be Exposed to Outdoor Air Pollution and Other Cumulative Environmental Stressors

Various studies conclude that *urban communities*, *low-income communities*, and *communities of color*, who are more likely to live *closer* to traffic or facilities that produce pollutants (e.g., factories), are disproportionately exposed to outdoor air pollution. Moreover, some marginalized *communities* may be disproportionately exposed to *multiple* and/or *cumulative* social and environmental stressors (e.g., substandard housing conditions and extreme heat, limited safe greenspace access; and air pollution) over their lifetime, which compound to negatively impact health and well-being and exacerbate health disparities.<sup>4</sup>

## Other Respiratory Issues

*Prenatal* and *childhood* exposure to outdoor air pollution is associated with an increased risk for childhood respiratory issues, including:

- **Impaired Lung Growth and Function.** Prenatal exposure to air pollutants can impact *lung development* in children, which can in turn contribute to poor respiratory outcomes into adulthood. Furthermore, another *study* shows that exposure to air pollution during pregnancy and early life is associated with reduced lung function in mid-childhood.
- **Respiratory Infections.** Exposure to air pollution during childhood can also increase risk for *respiratory infections*, including bronchitis and *bronchiolitis*, *otitis media*, and others.

## Behavior and Development

*Evidence* suggests exposure to outdoor air pollution in utero or during *childhood* can impact brain development and *behavior*. Specifically, one *study* demonstrates the relationship between exposure to air pollution and neurological development, including an increased risk of developmental disorders like attention-deficit/hyperactivity disorders or autism spectrum disorders. Another *study* shows children ages 2 to 4 who were exposed to air pollution were at a higher risk of worse behavioral function and cognitive performance.

## Conclusion

Children are uniquely vulnerable to the impacts of outdoor air pollution. In utero and childhood exposure to outdoor air pollution can negatively impact birth outcomes, child health, and development. Moreover, certain communities experience disproportionately higher exposures to outdoor air pollution based on where they live. Further, they may be impacted by cumulative environmental exposures, perpetuating and worsening health disparities. Policies that limit air pollution can help mitigate the impacts of poor outdoor air quality on child health and well-being for all.

## Endnotes

<sup>1</sup> While this issue brief focuses on outdoor air pollution, children and families can also be affected by exposure to toxins inside, such as asbestos or lead paint. See "[Impact of Housing on Child Health](#)" for evidence of how housing quality and stability can impact child health and well-being.

<sup>2</sup> The Clean Air Act was first enacted as the Air Pollution Control Act ([Public Law 84-159](#)) in 1955. Congress has [amended](#) the Clean Air Act in the years since, including [major revisions](#) made in [1970](#), [1977](#) and [1990](#).

<sup>3</sup> Through the Clean Air Act, the EPA [reviews](#) the latest data about air quality and health outcomes and updates the standards as necessary approximately every five years.

<sup>4</sup> The EPA defines [cumulative impact](#) as "the totality of exposures to combinations of chemical and nonchemical stressors and their effects on health, well-being and quality of life outcomes."

<sup>5</sup> Air pollution can cause pollen to change its [composition](#) causing it to release more particles.

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